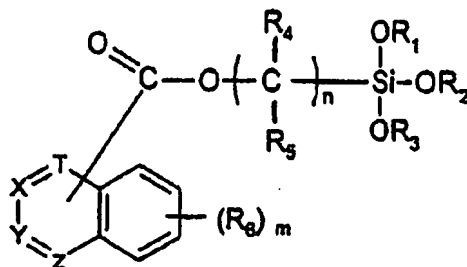


Claims

46 X. (Currently Amended) A method Method for the preparation of a silyl alkyl ester having the Formula (I)



(I)

in which

R₁, R₂, and R₃ are equal or different and represent alkyl, aryl and heteroaryl,

R₄ and R₅ are equal or different and represent hydrogen, halogen, alkyl, aryl and heteroaryl,

n is an integer from 1 to 10,

R₆ is a substituent selected from halogen, alkyl, aryl, heteroaryl, hydroxy, alkoxy, ary-ether, substituted and unsubstituted amino group, carboxy group, carboxylic acid ester group, carboxylic acid amide group, sulfonic acid group, sulfonic acid ester group, sulfonyl, thio, thioether and nitro,

m is an integer from 0 to 4,

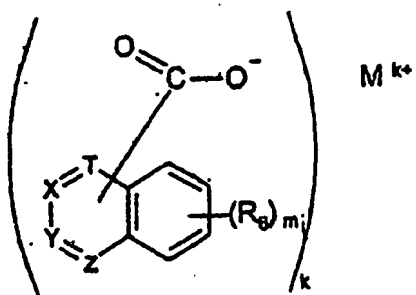
T, X, Y and Z each represent carbon,

a benzo group, which is m-fold substituted with R₆ or which is unsubstituted, is condensed on one of the bonds T-X, X-Y or Y-Z to form a trinuclear aromatic ring system,

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wherein the silyl alkyl ester group is substituted at the middle ring of said trinuclear aromatic ring system,

wherein a carboxylic acid salt of Formula (II)

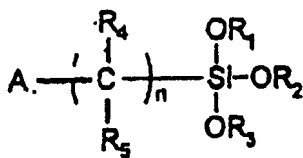


(II)

in which k is an integer from 1 to 4 and M is a metal,

is reacted with an organosilicon compound of

Formula (III)



(III)

in which A represents a nucleofugal leaving group.

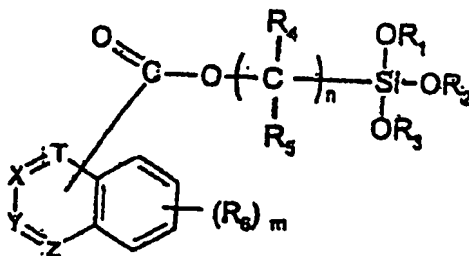
47 ~~2.~~ (Currently Amended) ⁴⁶ ~~The Method method~~ according to Claim ~~1~~, wherein the metal M is selected from the groups Ia, IIa, IIIa, IVa, Ib, IIb, IVb and VIIIb of the periodic table.

48 ~~3.~~ (Currently Amended) ⁴⁶ ~~The Method method~~ according to Claim ~~1~~ or 2, wherein k = 1.

49 ~~4.~~ (Currently Amended) ~~The Method method~~ according to ~~any one of Claims 1 to 3 claim~~ ⁴⁷ ~~2~~ wherein M is selected from metals of Group Ia.

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- 50 8. (Currently Amended) The Method method according to any one of Claims 1 to 4 claim ~~49~~ wherein the metal M is selected from lithium, sodium and potassium.
- 51 8. (Currently Amended) The Method method according to any one of Claims 1 to 5 claim ~~49~~ wherein the metal M is sodium ~~and/or~~ or potassium ~~and particularly potassium.~~
- 52 1. (Currently Amended) The Method method according to any one of Claims 1 to 6 claim ~~46~~ wherein the nucleofugal leaving group A comprises halogen. ~~represents halogen, preferably chlorine and/or bromine and yet more preferably chlorine.~~
- 53 8. (Currently Amended) The Method method according to any one of Claims 1 to 7 claim ~~46~~ wherein the carboxylic acid salt of Formula (II) is reacted with the organosilicon compound of Formula (III) in a solvent or solvent mixture, from which the metal salt of the formula MA_x formed is precipitated.
- 54 8. (Currently Amended) The Method method according to Claim ⁵³ 8, wherein [[as]] a solvent or solvent mixture [[,]] comprising N,N-dimethylformamide, ~~and/or~~ N,N-dimethylacetamide or a mixture thereof is used.
- 55 10. (Currently Amended) Δ Silyl alkyl ester having the formula (I)



(I)

wherein

R₁, R₂, and R₃ are equal or different and represent alkyl, aryl and heteroaryl,

R₄ and R₅ each represent hydrogen,

n is an integer from 3 to 5,

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R₆ is a substituent selected from halogen, alkyl, aryl, heteroaryl, hydroxy, alkoxy, ary-lether, substituted and unsubstituted amino group, carboxy group, carboxylic acid ester group, carboxylic acid amide group, sulfonic acid group, sulfonic acid ester group, sul-fonyl, thio, thioether and nitro,

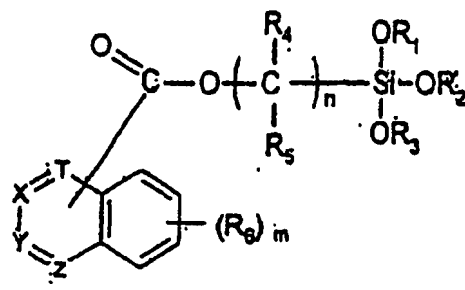
m is an integer from 0 to 4,

T, X, Y and Z each represent carbon,

a benzo group, which is substituted m-fold with R₆ or which is unsubstituted, is con-densed on one of the bonds T-X, X-Y or Y-Z to form a trinuclear aromatic ring system, wherein the silyl alkyl ester group is substituted at the middle ring of said trinuclear aromatic ring system.

- 56 11. (Currently Amended) ⁵⁵The silyl Silyl alkyl ester according to Claim ~~10~~⁵⁵, wherein R₁, R₂, and R₃ each represent alkyl.
- 57 12. (Currently Amended) ⁵⁵The silyl Silyl alkyl ester according to Claim ~~10 or 11~~⁵⁵, wherein R₁, R₂, and R₃ are selected, independently of one another, from methyl, ethyl, n-propyl, iso-propyl, n-butyl, 2-methylpropyl, 1-methylpropyl and 1,1-dimethylethyl.
- 58 13. (Currently Amended) ⁵⁴The silyl Silyl alkyl ester according to ~~any one of Claims 10 to 12~~⁵⁴ claim 12, wherein R₁, R₂, and R₃ each represent methyl or ethyl.
- 59 14. (Currently Amended) ⁵⁵The silyl Silyl alkyl ester according to ~~any one of Claims 10 to 13~~⁵⁵ claim 10, wherein a benzo group, which is m-fold substituted with R₆ or which is un-substituted, is condensed on the X-Y bond.
- 60 15. (Currently Amended) ⁵⁹The silyl Silyl alkyl ester according to Claim ~~14~~⁵⁹, wherein an un-substituted benzo group is condensed on the X-Y bond and m=0.
- 61 16. (Currently Amended) ⁵⁵The silyl Silyl alkyl ester according to ~~any one of Claims 10 to 13~~⁵⁵ claim 10, wherein a benzo group, which is m-fold substituted with R₆ or which is un-substituted, is condensed on either the T-X or Y-Z bond.
- 62 17. (Currently Amended) ⁶¹The silyl Silyl alkyl ester according to Claim ~~16~~⁶¹, wherein an un-substituted benzo group is condensed on either the T-X or Y-Z bond and m=0.
- 63 18. (Currently Amended) Δ Silyl alkyl ester having the formula (I)

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(I)

wherein

R_1 , R_2 , and R_3 are equal or different and represent alkyl, aryl and heteroaryl,

R_4 and R_5 are equal or different and represent hydrogen, halogen, alkyl, aryl and heteroaryl,

n is an integer from 1 to 10,

R_6 is a substituent selected from halogen, alkyl, aryl, heteroaryl, hydroxy, alkoxy, ary-lether, substituted and unsubstituted amino group, carboxy group, carboxylic acid ester group, carboxylic acid amide group, sulfonic acid group, sulfonic acid ester group, sulfonyl, thio, thioether and nitro,

m is an integer from 0 to 4,

T, X, Y and Z each represent carbon,

a benzo group, which is substituted m -fold with R_6 or which is unsubstituted, is condensed on either the T-X or Y-Z bond to form a trinuclear aromatic ring system, wherein the silyl alkyl ester group is substituted at the middle ring of said trinuclear aromatic ring system.

64 19. (Currently Amended) ⁶³ The silyl alkyl ester according to Claim 18, wherein R_1 , R_2 , and R_3 each represent alkyl.

- 65 20. (Currently Amended) ⁶³The silyl Silyl alkyl ester according to Claim ~~18~~ ⁶³or 19, wherein R₁, R₂, and R₃ are selected, independently of one another, from methyl, ethyl, n-propyl, iso-propyl, n-butyl, 2-methylpropyl, 1-methylpropyl and 1,1-dimethylethyl.
- 66 21. (Currently Amended) ⁶⁵The silyl Silyl alkyl ester according to ~~any one of Claims 18 to 20~~ ⁶⁵claim 20, wherein R₁, R₂, and R₃ each represent methyl or ethyl.
- 67 22. (Currently Amended) ⁶³The silyl Silyl alkyl ester according to ~~any one of Claims 18 to 21~~ ⁶³claim 18, wherein R₄ and R₅ each represent hydrogen.
- 68 23. (Currently Amended) ⁶³The silyl Silyl alkyl ester according to ~~any one of Claims 18 to 22~~ ⁶³claim 18, wherein n is an integer from 1 to 5, ~~particularly from 1 to 3, yet more preferably 1 or 3 and most preferably 3.~~
- 69 24. (Currently Amended) ⁶³The silyl Silyl alkyl ester according to ~~any one of Claims 18 to 23~~ ⁶³claim 18, wherein an unsubstituted benzo group is condensed on either the T-X or Y-Z bond and m=0.
- 70 25. (Currently Amended) ⁵⁵A composition ⁶³Composition which comprises at least one silyl alkyl ester according to ~~claim 10 or 18~~ ⁵⁵claim 10 ⁶³or 18 ~~any one of Claims 10 to 24~~ and at least one further reactive silane.
- 71 26. (Currently Amended) ⁷⁰A composition ⁷⁰Composition according to Claim ~~25~~ ⁷⁰, wherein the reactive silane is selected from alkoxysilanes and halogen silanes, ~~particularly chlorosilanes.~~
- 72 27. (Currently Amended) ⁷⁰A composition ⁷⁰Composition according to Claim ~~25~~ ⁷⁰or 26, wherein the reactive silane ~~is selected from~~ ⁷⁰comprises triethoxysilane (HTEOS), tetraethoxysilane (TEOS), methyltriethoxysilane (MTEOS), dimethyldiethoxysilane, tetramethoxysilane (TMOS), methyltrimethoxysilane (MTMOS), trimethoxysilane, dimethyldimethoxysilane, phenyltriethoxysilane (PTEOS), phenyltrimethoxysilane (PTMOS), diphenyldiethoxysilane, diphenyldimethoxysilane, trichlorosilane, methyltrichlorosilane, ethyltrichlorosilane, phenyltrichlorosilane, tetrachlorosilane, dichlorosilane, methyldichlorosilane, dimethyldichlorosilane, chlorotriethoxysilane, chlorotrimethoxysilane, chloromethyltriethoxysilane, chloroethyltriethoxysilane, chlorophenyltriethoxysilane, chloromethyltrimethoxysilane, chloroethyltrimethoxysilane and chlorophenyltrimethoxysilane.

- 73 28. (Currently Amended) ⁷³A composition ~~Composition~~ according to ~~any one of Claims 25 to 27~~ ²⁷claim 27, wherein the reactive silane is selected from triethoxysilane (HTEOS), tetraethoxysilane (TEOS), methyltriethoxysilane (MTEOS), tetramethoxysilane (TMOS), methyltrimethoxysilane (MTMOS), phenyltriethoxysilane (PEOS) and phenyltrimethoxysilane (PTMOS).
- 74 29. (Currently Amended) ⁷⁴A composition ~~Composition~~ according to ~~any one of Claims 25 to 28~~ ²⁸claim 28, which comprises a solvent or solvent mixture.
- 75 30. (Currently Amended) ⁷⁴A composition ~~Composition~~ according to Claim ²⁹29, wherein the solvent or solvent mixture comprises at least one component selected from water, linear or branched alkyl alcohol having 1 to 6 carbon atoms, linear or branched ketone having 1 to 6 carbon atoms, linear or branched carboxylic acid ester having 1 to 6 carbon atoms and or linear or branched carboxylic acid amide having 1 to 6 carbon atoms.
- 76 31. (Currently Amended) ⁷⁴A composition ~~Composition~~ according to Claim ²⁹29 ~~or 30~~, wherein the solvent or solvent mixture comprises at least one component selected from water, acetone, 1-propanol, 2-propanol, butanol, methylisobutylketone, methoxypropanol, propoxypropanol, ethyl acetate and propyl acetate.
- 77 32. (Currently Amended) ⁷⁴A composition ~~Composition~~ according to ~~any one of Claims 25 to 31~~ ³¹claim 31, which comprises an aqueous solution of at least one protonic acid and/or or an aqueous solution of at least one acid anhydride.
- 78 33. (Currently Amended) ⁷⁷A composition ~~Composition~~ according to Claim ³²32, wherein the protonic acid is nitric acid.
- 79 34. (Currently Amended) ⁷⁴A method ~~Method~~ for the preparation of a polysiloxane composition, wherein a composition according to ~~any one of Claims 25 to 33~~ ³³claim 33 is provided and the silyl alkyl ester is condensed with the reactive silane.
- 80 35. (Currently Amended) ⁷⁹The method ~~Method~~ according to Claim ³⁴34, wherein the condensation of the silyl alkyl ester with the reactive silane is carried out by heating.
- 81 36. (Currently Amended) ⁸⁰The method ~~Method~~ according to Claim ³⁵35, wherein the composition is heated for 1 to 24 hours, ~~more preferably for 1 to 10 hours and yet more preferably for 2 to 6 hours~~ at a temperature of 20 to 100°C, ~~more preferably from 40 to 80°C and yet more preferably from 60 to 80°C.~~

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82 37. (Currently Amended) The method Method according to any one of Claims 34 to 36 claim ³⁴34, wherein during the condensation, polysiloxane having a low molecular weight and degree of cross-linking is formed, which is dissolved or suspended in the solvent or solvent mixture.

83 38. (Currently Amended) The method Method according to any one of Claims 34 to 37 claim ³⁴34, wherein during or after the condensation, a diluting solvent is added.

84 39. (Currently Amended) The method Method according to Claim ⁸³38, wherein the diluting solvent comprises at least one component selected from methanol, ethanol, 2-propanol, butanol, acetone, propyl acetate, ethyl lactate, propylene glycol propyl ether, diacetone alcohol and methoxypropanol.

85 40. (Currently Amended) A polysiloxane Polysiloxane composition, which is obtainable by a method as defined in any one of Claims 34 to 39 ⁷⁹formed by the method of claim 34.

86 41. (Currently Amended) A coated Coated substrate, which is obtainable by a method ⁷⁰comprising formed by applying the composition as defined in any one of claim 25 ⁸⁵claims 25 to 33 or the polysiloxane composition as defined in of claim 40 to the substrate; and

heating the substrate with the composition or polysiloxane composition applied thereon.

87 42. (Currently Amended) A coated Coated substrate according to claim ⁸⁶41, wherein applying of said composition or said polysiloxane composition is performed by means of spin techniques.

88 43. (Currently Amended) A coated Coated substrate according to claim ⁸⁶41 or 42, wherein the substrate is selected from a semiconductor device, a silicon-wafer, a glass plate and or a metal plate.

89 44. (Currently Amended) A use Use of a composition as defined in any one of Claims 25 to 33 claim ⁸⁵25 or of a polysiloxane composition as defined in of Claim ⁸⁹43 for the preparation of a coating on a substrate.

90 45. (Currently Amended) The use Use according to Claim ⁸⁹44, wherein the composition or the polysiloxane composition is applied to the substrate and heating the substrate with said composition or polysiloxane composition applied thereon is heated.

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91 ~~46~~. (Currently Amended) ⁸⁹The use ~~Use~~ according to Claim ~~44~~ ⁸⁹or 45, wherein the composition or the polysiloxane composition is applied to the substrate by means of spin techniques.

92 ~~47~~. (Currently Amended) ⁸⁹The use ~~Use~~ according to ~~any one of Claims 44 to 46~~ ⁸⁹claim ~~44~~, wherein the substrate is a semiconductor device or a silicon wafer.

93 ~~48~~. (Currently Amended) A method ~~Method~~ for the photolithographic production of an integrated circuit pattern comprising the steps of:

(a) —radiating a stack through a mask, said stack comprising the lower substrate, an upper photoresist layer, at least one anti-reflective layer formed from the composition ~~as defined in any one of claims 25 to 33~~ ⁷⁰of claim ~~26~~ ⁸⁵or from the polysiloxane composition as defined in claim ~~40~~, and optionally at least one further layer to be structured, each being located between said substrate and said photoresist layer,

(b) —developing the exposed stack to produce openings in said photoresist layer,

(c) —etching a first pattern through said openings in said at least one anti-reflective layer and optionally at least one further layer to be structured, and

(d) —stripping off said photoresist layer, at least one anti-reflective layer and optionally at least one further layer to be structured to produce the integrated circuit pattern.

94 ~~49~~. (Currently Amended) ⁹³The method ~~Method~~ according to claim ~~48~~ ⁹³, wherein the substrate is a semi-conductor device or a silicon wafer.

95 ~~50~~. (Currently Amended) ⁹³The method ~~Method~~ according to claim ~~48~~ ⁹³or 49, wherein in step (a) the stack is radiated with ultraviolet light having a wavelength of less than 260 nm, particularly 193 nm or 248 nm.

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